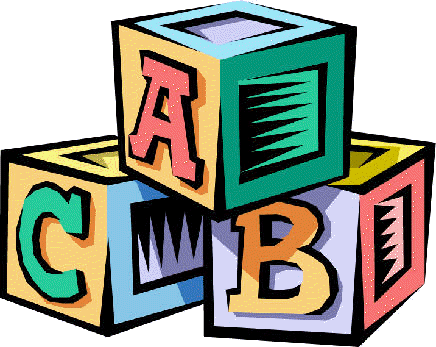
**Grade 7 Mathematics: The best arrangement!**

This task will be assessed against criteria B: investigating patterns

and criteria C: communication

A toy company wants to market a set of children’s

Alphabet blocks. Each block is a cube with 1cm edges, so each block has a volume of 1cubic cm.

**Task:** The Company wants to package 24 blocks in the shape of a rectangular prism and then package them in a box that exactly fits the prism.

**1.** Find all the ways 24 cubes can be arranged into a rectangular prism

a. make a sketch of each arrangement with each dimension labeled.

b. Fill in a table like the one below with all the possible arrangements.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Length (cm)** | **Width (cm)** | **Height (cm)** | **Volume (cm3)** | **Surface Area**  **(cm2)** |
|  |  |  | **24** |  |
|  |  |  | **24** |  |

**2.** Which of your arrangements makes the box made with the least material? Which makes the box with the most material?

Is there a best packaging arrangement, ie the one that allows you to fit the most cubes, whilst still using the least amount of packaging?

**3.** In groups of 3 or 4, I want you to investigate the question above.

a. Each member of your group is to investigate the arrangements for one of the following numbers of cubes.

8 cubes 12 cubes 27cubes or 20 cubes

**Results are to be put into a table like the one in question 1.**

b. Each group member is to include 3 of the tables from their different group members into their task.

**4.** You are to find the arrangement that would require the **most** amount of packaging material for:

a. 8 cubes

b. 12 cubes and

c. 27 cubes.

**5.** Looking at all your arrangements describe the relationship you discovered about the rectangular arrangements of cubes that need the **most packaging**.

**6.** Can you explain in words why this might be so?

**7.** You are to find the arrangement that would require the **least** amount of packaging material for:

a. 8 cubes

b. 12 cubes and

c. 27 cubes.

**8.** Looking at all your arrangements describe the relationship you discovered about the rectangular arrangements of cubes that need the **least packaging**.

**9.** Can you explain why this might be so?

**10.**If you were to package 16 cubes, using the relationships you discovered, find:

a. what arrangement would require the least packaging?

b. What arrangement would require the most packaging?